BOBCAT

Bobcats are potentially vulnerable to overharvest due to their low reproductive rate and low population density (Knick 1990). Human-caused mortality of bobcats appears to be largely additive to other sources of mortality (Anderson and Lovallo 2003). Bobcats are listed on Appendix II of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES). Consequently, management jurisdictions are required to document that harvest is not detrimental to the survival of the species (Rolley 1987). Nowell and Jackson (1996) claimed that reliable periodic population estimates were needed to guarantee that bobcat harvests were sustainable. However, they acknowledge that such estimates are likely to remain unavailable given the difficulties of estimating population size of bobcats and suggest that current management practices have been sufficient to prevent widespread and prolonged overharvest.

At the time of European settlement (~1830-1850) bobcats were distributed throughout Wisconsin but by the mid-1900s were largely restricted to the northern third of the state (Jackson 1961, Klepinger et al. 1979). Since 1980, harvesting of bobcats has been restricted to the area north of State Highway 64 (Creed and Ashbrenner 1983). Starting in 1992, bobcat harvest has been regulated by a limited permit quota system with a season limit of 1 bobcat (Rolley et al. 2001). A population goal of 2,500 $\pm$ 500 bobcats north of Hwy 64 has been established.

Current monitoring program.

Bobcat harvest has been determined through mandatory registration since 1973, providing accurate data on date, location, and method of harvest. Since 1983, hunters

and trappers have annually been required to surrender the carcass of harvested bobcats. Carcasses are examined to determine age, sex, pregnancy rates, and litter size.

Winter track surveys have been conducted across northern Wisconsin since 1977 and serve as the primary index of bobcat abundance (see Winter Track Survey). We currently use the Minnesota's Furbearer Population Model to integrate data on the size and sex and age composition of the harvest with estimates of age-specific reproductive rates and non-harvest mortality rates. Trends in winter track counts have been used to calibrate the population model, yielding estimates of likely population size and to assess the effects of future potential harvest levels.

Additional information about changes in abundance of bobcats has been provided by 1) reports of bobcat sightings (live and vehicle-killed) by WDNR personnel (Annual Mammal Survey), 2) harvester success rates (Mandatory Registration), 3) harvester opinion about changes in population status (Bobcat Hunter/Trapper Survey), 4) reported number of bobcats run per day with dogs (Bobcat Hunter/Trapper Survey), and 5) bobcat observations by deer hunters (Deer Hunter Wildlife Survey). Winter track counts in northern Wisconsin during 1993-2011 were significantly correlated to trends in harvester opinion of population changes ($r = 0.55$, $P = 0.01$) and number of bobcats run per day with dogs ($r = 0.49$, $P = 0.03$). Correlations between winter track counts and harvester success ($r = 0.41$, $P= 0.08$) and bobcat sightings by agency personnel ($r = 0.44$, $P = 0.06$) were nearly significant.

Wisconsin’s approach to monitoring bobcat population status is similar to that used in Minnesota (mandatory harvest reporting, mandatory carcass collection, annual scent-station surveys, and computer modeling of population changes). Minnesota’s

program was cited as an example of one of the better systems in North America by Nowell and Jackson (1996).

Challenges.

Bobcats typically occur at low densities, are widely dispersed, and are secretive (Anderson and Lovallo 2003), creating challenges for adequate monitoring. Direct estimation of population size via radio-telemetry studies or mark-recapture methods is costly and labor-intensive and extrapolation of results beyond specific study areas is risky if habitat types or harvest regimes differ. As a consequence, most management agencies rely on one or more indices of relative abundance to monitor bobcat populations. Unfortunately, the relationship between most indices and actual population density is unknown, is likely nonlinear, and may vary among habitats (Rolley 1987). Anderson (2001) argues that population indices that do not take into account variable and possibly time-trending detection probabilities do not provide reliable knowledge. However, Bluett et al. (2001) contend that is unrealistic to expect that bobcat indices will be validated against populations of known size because estimating population size is neither practical nor appropriate for geographic scales at which management occurs. Rolley (1987) suggested that track surveys are generally insensitive to short-term changes in bobcat populations because of the low detection rates and relatively high variability but noted that such techniques appear able to detect consistent long-term trends over broad geographic areas. Rolley (1987) encouraged managers to use several techniques simultaneously, suggesting that managers can be more confident if several indices show the same trend.

Interest in the status of bobcats in central Wisconsin has grown with increased public demand for expanded harvest opportunity. Adams (2009) identified a number of isolated areas in central and southern Wisconsin with habitat potentially suitable for bobcats and research is currently underway at U. W. Stevens Point to estimate bobcat population density in selected study areas in central Wisconsin. Winter track survey transects were added in 10 central Wisconsin counties starting in 1998 but completion of the surveys has been more difficult than in northern counties due to less frequent suitable snow conditions, higher human population density and more frequent snow plowing. If harvest of bobcats is authorized in central and/or southern Wisconsin it will be important but challenging to develop an effective and affordable monitoring program for this region.

Alternative Surveys

Bluett et al. (2001) and Roberts and Crimmins (2010) reviewed survey methods used by states to monitor bobcats. Methods included hunter/trapper surveys, harvest data analyses, employee opinion, sightings reports, population modeling, archer's index, sign/track survey, scent-station survey, prey survey, spotlight survey, landowner/rural mail carrier survey, mark-recapture, road-kill survey, incidental captures, summer roadside survey, and radio-telemetry and habitat mapping. In the most recent survey of state bobcat management programs, a majority of states reported using more than 1 survey method, but relatively few reported using population models because of the limited availability of data for model development (Roberts and Crimmins 2010).

A number of states in the Midwest and Northeast use an archer's index as part of their monitoring program for bobcats and other furbearers. Typically, avid archery deer

hunters are provided with logbooks to record their observations and activities and index values are computed as the number of bobcat sightings/1000 hr of archery hunting (Anderson and Lovallo 2003). Bluett et al. (2001) note that bobcat sightings by archers in Illinois were relatively infrequent and confidence intervals on index values were large. Consequently, there was limited ability to detect annual changes in abundance; however, the method proved useful for monitoring long-term trends in abundance (bobcat sightings increasing from 0.53/1,000 hr in 1992 to 1.10/1,000 hr in 1998). Bluett et al. (2001) found similar trends in bobcat sightings from their archer's index and an independent survey of firearm deer hunters.

Rolley et al. (2001) recommended implementation of a bowhunter wildlife observation survey in Wisconsin to strengthen the bobcat population monitoring program. In May 2000 the Furbearer Advisory Committee reviewed information provided by Illinois, Indiana, Kansas, Missouri, and New York and endorsed the survey concept and recommended efforts to obtain funding for direct mailings to cooperating bowhunters. While funding for direct mailings to archers has not been secured, the department did initiate an online Deer Hunter Wildlife Survey in 2009 (Dhuey et al. 2011). Survey design differs from the typical archer survey in a number of ways (e.g., participants are self-selected, both gun and archery hunters can participate, observations can be submitted for the entire deer season). Because only 3 years of data are currently available, it is not possible to evaluate the utility of the Deer Hunter Wildlife Survey for bobcat population monitoring.

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